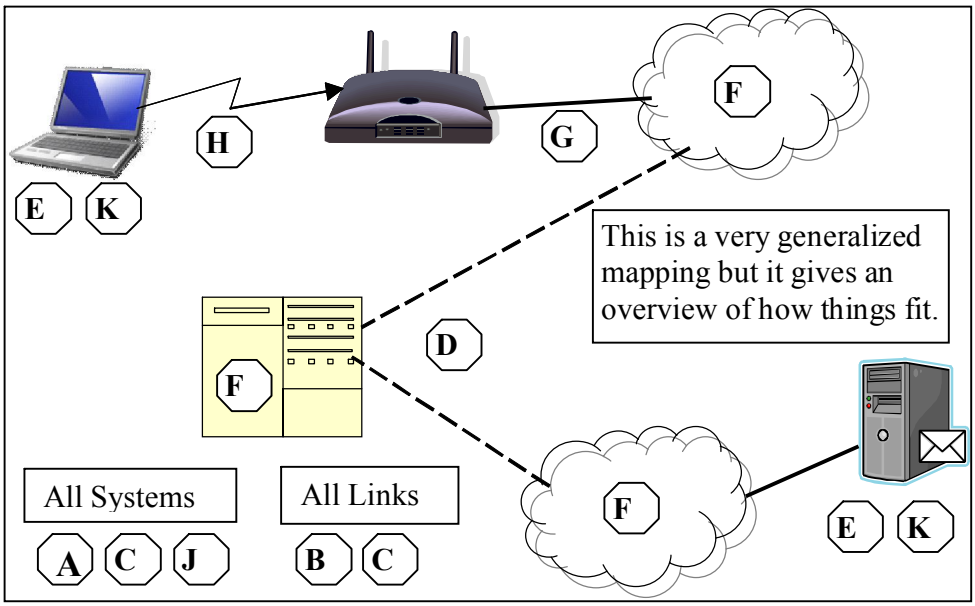
Introduction to the Internet

1.

Session
Data Link
Presentation
Physical
Network
Application
Transport

Application
Presentation
Session
Transport
Network
Data Link
Physical

2.



A IPv4, IPv6
B Data Comms
Data Encoding
C Error Detection
D Multiplexing
E Flow Control
Error Control
F Routing
G LAN
H Wireless
J WAN
K Transport Protocols

3. Match the following to one of the five internet layers.
   a. Route determination
   b. Flow control
   c. Interface to Physical world
   d. Responsibility for delivery between adjacent nodes
   e. Reassembly of data packets
   f. Error correction and retransmission

Answers :
a. Internet Layer
b. data link, transport layers
c. physical layer
d. data link layer
e. transport layer
f. data link layer, transport layer

4. A communications link is advertised as 2Mbps. What does Mbps mean? How many bits will the link transmit in one second (a) 2,000,000 or (b) 2,097,152? **Answer : (a)**

5. A data file is said to be 1Mbyte in length. Does it have (a) 1,048,576 bytes or (b) 1,000,000 bytes. ? **Answer : (a)**

6. Suppose an application layer entity wants to send an L-byte message to its peer process, using an existing TCP connection. The TCP segment consists of the message plus 20 bytes of header. The segment is encapsulated into an IP packet that has an additional 20 bytes of header. The IP packet in turn goes inside an Ethernet frame that has 18 bytes of header and trailer. What percentage of the transmitted bits in the physical layer correspond to message information, if L = 100 bytes, 500 bytes, 1000 bytes?

(*hints*: slide #40 of Lecture notes #1. Each TCP/IP layer adds header information to create new data unit before passing to lower layer.)

TCP/IP over Ethernet allows data frames with a payload size up to 1460 bytes. Therefore, L = 100, 500 and 1000 bytes are within this limit. The message overhead includes:

• TCP: 20 bytes of header
• IP: 20 bytes of header
• Ethernet: total 18 bytes of header and trailer.
So total overhead is 20 + 20 +18 = 58 bytes.

Efficiency is,
U= (part/whole) x 100

Therefore,

L = 100 bytes, 100/(100 + 58) = 63% efficiency.
L = 500 bytes, 500/(500 + 58) = 90% efficiency.
L = 1000 bytes, 1000/(1000 + 58) = 95% efficiency

7. Explain the difference in operation between circuit switching and packet switching. If you had bursty multimedia traffic, which kind of connection would you choose? What layer in the OSI stack are we operating on?

We are operating in the Network Layer.

Circuit switching requires a path to be established first before data can be transmitted, similar to dialing a telephone number. After transmissions are complete, the call must be explicitly terminated. During the call, a set bandwidth (data rate) is guaranteed to be available to the user (regardless of how the underlying network provides it)

In Packet switching, a network accepts a packet addressed to the receiver and does its best to deliver it (Best Effort). When each packet arrives at a router, it makes a forwarding decision based on the destination address and sends it on until the last router recognizes the address and completes the delivery.